Laboratory Guidebook
Notice of Change

Chapter **new**, revised**,** or archived: MLG 10 Appendix 7.00

Title: Key to Probable Cause of Spoilage in Semi-Acid Canned Foods

Effective Date: 01/10/22

Description and purpose of change(s):

This table outlines the probable causes of spoilage in semi-acid canned foods and was issued in association with MLG 10 Examination of Heat Processed, Hermetically Sealed (Canned) Meat and Poultry Products.

United States Department of Agriculture
Food Safety and Inspection Service, Office of Public Health Science

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Revision: Original	Replaces: NA	Effective: 01/10/22

Key to Probable Cause of Spoilage in Semi-Acid Canned Foods

Characteristics of Material in Cans							
Condition of cans	**Odor**	**Appearance**	**Gas (CO_2 &H_2)**	**pH (Semi-Acid Foods; pH Range 4.6 to 5.0)**	**Smear**	**Cultures**	**Diagnosis**
Swells **Note: Cans are sometimes flat**	Normal to "metallic"	Normal to frothy (Cans usually etched or corroded)	More than 20% H_2	Normal	Negative to occasional organisms	Negative	Hydrogen swells
	Sour	Frothy; possibly ropy brine	Mostly CO_2	Below Normal	Pure or mixed cultures of rods, coccoids, cocci, yeasts or molds	Growth, aerobically and/or anaerobically at 35°C., and possibly at 55°C.	Leakage
	Sour	Frothy; possibly ropy brine, food particles firm with uncooked appearance	Mostly CO_2	Below Normal	Pure or mixed cultures of rods, coccoids, cocci and yeasts	Growth, aerobically and/or anaerobically at 35°C., and possibly at 55°C. (If product received high exhaust, only spore formers may be recovered)	No process given
	Normal to sour-cheesy	Frothy	H_2 and CO_2	Slightly to definitely below normal	Rods - med. Short to med. long, usually granular; spores seldom seen	Gas, anaerobically at 55°C., and possibly slowly at 35°C.	Post-processing temperature abuse Thermophilic anaerobes
	Slightly off - possibly ammoniacal	Normal to frothy		Slightly to definitely below normal	Rods; occasionally spores observed	Growth, aerobically and/or anaerobically with gas at 35°C and possibly at 55°C. Pellicle in aerobic broth tubes. Spores formed on agar and in pellicle.	Under-processing B. subtilis type
	Butyric acid	Frothy, large volume gas	H_2 and CO_2	Definitely below normal	Rods - bipolar staining; possibly spores	Gas anaerobically at 35°C. Butyric acid odor	Under processing - butyric acid anaerobe

Characteristics of Material in Cans Cont.							
Condition of cans	**Odor**	**Appearance**	**Gas (CO_2 &H_2)**	**pH**	**Smear**	**Cultures**	**Diagnosis**
No vacuum and/or cans buckled	Normal	Normal	No H_2	Normal to slightly below normal	Negative to moderate number of organisms	Negative	Insufficient vacuum caused by: 1) Incipient spoilage, 2) Insufficient exhaust, 3) Insufficient blanch, 4) Improper retort cooling procedures, 5) Over fill
Flat cans (0 to normal vacuum)	Sour to "medicinal"	Normal to cloudy brine		Slightly to definitely below normal	Rods, possibly granular in appearance	Growth without gas at 55°C. and possibly at 35°C. Growth on Thermoacidurans agar	Under processing *B. coagulans*
	Normal to sour	Normal to cloudy brine; possibly moldy		Slightly to definitely below normal	Pure or mixed cultures or rods, coccoid, cocci or mold	Growth, aerobically and/or anaerobically at 35°C., and possibly at 55°C.	Leakage